

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 7

### REMARKS

1. The Office Action states, in Section 4, that:

Claims 1-7 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (6688745 B2) in view of Kudryashov et al. (6736507 B2).

Regarding claims 1 and 7, Ross et al. discloses, in figure 2, an ophthalmic adaptive-optics instrument for obtaining patient-verified prescription of low and high-order aberrations, comprising: ... a wavefront-sensing device (130) sensing the aberration of said subject eye (106) via said aberration-compensating element (140) (col. 3, lines 25-27); ... and wherein said ophthalmic adaptive-optics instrument provides, by subtracting said residual aberration from said total aberration, said patient-verified prescription of low-and-high order aberrations. Kudryashov et al. discloses corresponding to a null command signal and the residual aberration for optimal visual acuity, ...

Applicant has studied the teaching of Ross et al. (6688745 B2) and appreciates a similar motivation for patient-verified prescription of low and high-order aberrations. Applicant has noticed that the following differences between the present application and the patent (6688745 B2) are distinct and significant.

a) The present application discloses that the wavefront measurement is made through the aberration-compensating element 21 (Figure 1 of the application). **The wavefront measured this way includes the aberration correction of the aberration-compensating element 21.** The advantage of this configuration is that the response of the aberration-

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 8

compensating element 21 to its control signal 51 is monitored via the wavefront sensing device 22.

In comparison, the patent (6688745 B2) teaches that the wavefront measurement is independent from the aberration-compensation element 140 (Figure 2 of the patent). **The wavefront measured this way does not include the aberration correction of the aberration-compensating element 140.** The aberration correction of the aberration-compensating element 140 is thus not monitored by the wavefront measuring device 130.

- b) The present application discloses that the patient-verified prescription of low and high-order aberrations is **determined by "subtracting said residual aberration from said total aberration"**, of which both said residual aberration and said total aberration are measured by the wavefront sensing device 22. The prescription determined this way has the advantage of not relying on the accuracy and precision of the aberration-compensating element 21.

In comparison, the patent (6688745 B2) teaches that the preferred corrective prescription is determined by an input signal to the aberration-compensating element 140. The accuracy and precision of the prescription are thus highly reliant on the accuracy and precision of the aberration-compensating element 140, in addition to the accuracy and precision of the wavefront measuring device 130.

Applicant has amended claims 1 and 7 by adding to the wavefront sensing device a limitation: wherein said wavefront-sensing device measures a residual aberration of said subject eye through said aberration-compensating element with controllable aberration compensation. This amendment makes the present application further distinct from the patent (6688745 B2). This amendment is based on a last sentence of paragraph 0019 of Patent Publication

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 9

No. US 2004/0160576 A1 of this application, and thus no new material is added.

Applicant has also studied the patent of Kudryashov et al. (6736507 B2) and notices the teaching of a deconvolution algorithm "for correcting, small, high order aberrations on the wavefront and residual low order aberrations" (Abstract) or "to correct residual low order aberrations not corrected by said first wavefront compensation means" (claim 11). The following differences between the present application and the patent (6736507 B2) are distinct and significant.

a) The present application discloses "subjective feedback control means enabling the patient to actively produce said command signal to adjust said aberration-compensating element and to verify the amount of aberration compensation for optimal visual acuity" (claim 1). The aberration correction is thus subjective, and **it is the subject command signal that leads to a residual aberration for optimal visual acuity.**

In comparison, the patent (6736507 B2) teaches "a wavefront sensor optically coupled to said imager optics for measuring the wavefront produced by optical aberrations within said eye and said imager optics;" and "first wavefront compensation means optically coupled to said imager optics for correcting large, low order aberrations in said wavefront" (claim 1, col. 9, lines 52-58). The aberration correction is thus objective, and **it is the imperfection of the first wavefront compensation means that leads to the residual low order aberrations**, which are to be removed by a deconvolution algorithm means (claim 11, col. 10, lines 39-43).

b) The present application discloses that "said ophthalmic adaptive-optics instrument can measure the total aberration of said subject eye, corresponding to a null command signal, and the residual aberration for optimal visual acuity,

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 10

corresponding to a command signal for optimal visual acuity" (claim 1). The residual aberration is thus detected by the wavefront-sensing device 22, and **it includes all remaining low and high order terms of aberrations needed for optimal visual acuity.**

In comparison, the patent (6736507 B2) teaches that "said second wavefront compensation means includes deconvolution algorithm means" and "said deconvolution algorithm means includes means to correct residual low order aberrations not corrected by said first wavefront compensation means" (claims 10-11, col. 10, lines 34-43). The residual low order aberrations are thus detected via a deconvolution algorithm, and **it is defined as remaining low order aberrations that are not corrected by said first wavefront compensation means.**

Therefore, the patent of Kudryashov et al. (6736507 B2) has no teaching, suggestion or motivation on a subjective, patient-verified residual aberration for optimal visual acuity. The residual low order aberrations of the patent (6736507 B2) are solely objective, remaining low order aberrations that are not corrected by said first wavefront compensation means.

In light of above comparisons, the amended claims 1 and 7 shall be in conditions patentable over Ross et al. (6688745 B2) in view of Kudryashov et al. (6736507 B2). Reconsideration and allowance are thus respectfully requested.

2. The Office Action states, in Section 4, that:

Claims 1-7 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (6688745 B2) in view of Kudryashov et al. (6736507 B2).

Regarding claim 2, Ross et al. discloses...

Regarding claim 3, Ross et al. discloses...

Regarding claim 4, Ross et al. discloses...

Regarding claims 5 and 6, Ross et al. discloses...

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 11

Applicant has amended claim 1 to be more explicitly distinct from the teaching of Ross et al. (6736507 B2). Claims 2-6 are dependent claims of claim 1 and shall be patentable pending on the merit of amended claim 1.

3. The Office Action states, in Section 4, that:

Claims 1-7 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (6688745 B2) in view of Kudryashov et al. (6736507 B2).

Regarding claim 23, Ross et al. discloses, in figure 2, an ophthalmic adaptive-optics instrument for obtaining patient-verified prescription of low and high-order aberrations, further comprising: relay optics (138) relaying wavefront at pupil of said subject eye (106) to said aberration-compensating element (col. 4, lines 16-21).

According to the patent (6688745 B2), "the projector 138 may be a known projector and may include conventional lenses for collimating the projected image 133" (col. 4, lines 16-18). Therefore, the projector 138 does not comprise relay optics relaying wavefront at pupil of said subject eye to said aberration-compensating element. Relay optics 20 (Figure 1 of the present application) is located and has to locate between the subject eye and the aberration-compensating element in order to relay wavefront at pupil of said subject eye to said aberration-compensating element. Therefore, claim 23 is not anticipated by or obvious from teaching of Ross et al. (6688745 B2)

4. The Office Action states, in Section 4, that:

Claims 1-7 and 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ross et al. (6688745 B2) in view of Kudryashov et al. (6736507 B2).

Regarding claim 24, Ross et al. discloses..

Applicant : Ming Lai  
Serial No. : 10/718,451  
Filed : 11/19/2003  
Page : 12


Regarding claim 25, Ross et al. discloses...

Claims 24-26 are dependent claims of claim 23 and shall be patentable pending on the merit of claim 23.

5. New claims 26-30 are added to further specify the present invention, while no new matter is added. Please refer to US Publication 2004/0160576 of present application, and claim 26 is readable from paragraph 0021, second sentence; claims 27 and 28, from paragraph 0023, second sentence; claims 29 and 30, from paragraph 0027, last sentence.

In summary, Applicant gratefully acknowledges Examiner's detailed explanations in the Office Action. Applicant has answered every issue raised in the Office Action and has amended the claims accordingly. More specifically, Applicant has amended independent claims 1 and 7 to be more explicitly distinct from the teaching of Ross et al. (6736507 B2). Reconsideration and allowance of the above referenced application are thus respectfully requested.

Respectfully submitted,

  
\_\_\_\_\_  
Ming Lai  
Applicant

Date: 1/4/08

Correspondence Name & Address:  
Ming Lai  
P. O. Box 90509  
Rochester, NY 14609